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ABSTRACT

The influences of student-level and campus factors on the academic performance of intercollegiate athletes were studied. Approximately 80 full-time student athletes were selected from each of 42 institutions in Division I of the National Collegiate Athletic Association (NCAA). Data were drawn from the 1987-88 National Study of Intercollegiate Athletes and were weighted to represent the population of approximately 56,000 student athletes at NCAA Division I schools nationwide. Three groups of students were identified in terms of their academic performance: those who performed well; those who performed at a moderate level; and those who performed poorly. Predictor variables were analyzed in eight areas: (1) time commitments; (2) finances; (3) athletic staff; (4) academic preparedness; (5) recruitment experiences; (6) housing; (7) course completion; and (8) context of the campus sports program. Analyses in each area also included four control variables: race; sport; class; and socioeconomic status. Findings provide a picture of the achievement of the student athlete. Race and type of sport were found to be significant predictors of academic performance; Scholastic Aptitude Test scores were not. Time spent in sports was not significantly related to the likelihood of being in the low academic performance group. In addition, a higher level of intercollegiate competition was related to the likelihood of low academic performance. Implications for student athletes are discussed. Twelve tables present study data. (SLD)

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Understanding Academic Performance:
1987-88 National Study of Intercollegiate Athletes

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Presented at:
The American Educational Research Association convention
April 3, 1991

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Executive Summary

The principal goal of this study is to gain a better understanding of the influences of student-level and campus factors on academic performance among intercollegiate athletes.

The data come from the 1987-88 National Study of Intercollegiate Athletes, conducted for the Presidents Commission of the National Collegiate Athletic Association (NCAA) by the American Institutes for Research (AIR). Approximately 80 full-time student-athletes (participating in football, basketball, and other sports) were selected from each of 42 institutions that were Division I members of the NCAA (Division I institutions offer the biggest sports programs in U.S. colleges and universities). This sample of institutions was designed to reflect the variation in location, size, and public/private status of all 291 Division I institutions in the nation. The data are weighted to represent the population of approximately 56,000 student-athletes at NCAA Division I institutions nationwide.

The outcome measure, "academic performance," is a composite index of cumulative college GPA, history of academic probation at college, number of college classes missed per week during the student's athletic season, and number of college classes missed per week out of season. Using the index, we distinguished three groups of student-athletes: (1) those who perform well academically, (2) those who perform at a moderate level, and (3) those who perform poorly. The Methods section of the attached report describes the specific values of these variables used to define the three groups.

Preliminary analyses indicated that predictive factors distinguishing students in the "high" academic performance group from students in the lower two groups differ from factors that distinguish students in the "low" performance group from the higher two groups. Consequently, we used multivariate logistic regression methods to estimate the likelihood of being in the "low" academic group (versus the other two groups) given different levels of each predictor, while controlling for the effects of other predictor and control variables. We used similar methods to compare the (independent) likelihood of being in the "high" academic group. Logistic regression models for males and females are analyzed separately.

We analyzed predictor variables in eight areas: (1) time commitments, e.g., hours per week spent preparing for class, (2) finances, e.g., whether paid employment was an important source of support, (3) athletic staff, e.g., perceived ability and willingness of one's coach to provide encouragement for academics, (4) academic preparedness, e.g., SAT and high school GPA, (5) recruitment experiences, e.g., exposure to different recruitment methods, (6) housing, e.g., living in athletic dorms, (7) course completion, e.g., incomplete courses, and (8) campus context, e.g., NCAA conference affiliation, and the competitive record of the institution's sports program. Analyses in each area also include four control variables: (a) Race (Black versus White), (b) Sport (football and men's and women's basketball versus other sports), (c) Class (freshman, sophomore, junior, senior, graduate student), and (d) socioeconomic status (SES).

In reviewing the key results from our analyses, it is important to keep in mind the general finding that, in many cases, factors related to low and high academic performance are not the same. We believe this suggests that future research and policy deliberations should distinguish between conditions and situations that may help student-athletes not to fail from those that may help them excel.

Key Results

- Consistent with prior research, we found a student-athlete's race and type of sport to be significant predictors of academic performance (for all results presented, the term "prediction" should not be interpreted to mean proof of causal effects). For males especially, being Black (versus White) and competing in intercollegiate football or basketball (versus other sports) significantly increases the likelihood of being in the low academic performance group and decreases the likelihood of being in the high academic group.

- SAT score (combined math and verbal) is not significantly related to the likelihood of being in the low academic performance group, although a high SAT score is related to an increased likelihood of being in the high academic group. In contrast, high school GPA is related (in the expected way) to both low and high academic performance at college. Because SAT scores currently play a powerful role in college admissions and athletic eligibility, the effectiveness of these scores for their intended purpose may need to be examined more closely.

- Time spent in sports is not significantly related to the likelihood of being in the low academic group, although greater time spent in sports is related to a decreased likelihood of being in the high academic group. In contrast, the likelihood of being in the low academic group is increased by greater time spent socializing and less time spent preparing for class. With respect to academic risk, these results suggest that limiting the time student-athletes spend playing and practicing may be less important than helping them to make better time-management decisions regarding the use of free time for class preparation.

- Student-athlete ratings of their coaches as knowledgeable, encouraging, and interested in players' academic pursuits are related to an increased likelihood of being in the high academic group and a decreased likelihood of being in the low academic group. Although this study could not distinguish the causal process underlying this relationship (e.g., coaches influencing academic success versus the possibility that academic success causes student-athletes to rate their coaches favorably), this finding highlights the importance of further exploring ways that coaches may help students succeed academically.

- For male student-athletes, endorsing the statement, "the information I got during recruitment was misleading and caused serious problems" is related to an increased likelihood of being in the low academic group and a decreased likelihood of being in the high academic group. This pattern is also similar for

males who do not believe that the information they got during recruitment helped them to make the right college choice. Although this study cannot evaluate the possibility of a "sour grapes" retrospective by student-athletes experiencing the most academic difficulties, these findings at least suggest the need for careful review of the contents of recruiting activities on a regular basis. An additional finding in this area also suggests the need to review recruiting pressures on students -- being recruited through many (rather than few) activities, e.g., letters, phone calls, visits, is related to an increased likelihood of being in the low academic group and a decreased likelihood of being in the high academic group.

- Living in school-owned or school-run housing with mostly other student-athletes is not significantly related to academic performance. In contrast, rooming with one or more teammates or other student-athletes is significantly related to an increased likelihood of being in the low academic performance group and a decreased likelihood of being in the high academic group. In light of current debates over athletic dormitories, these findings suggest that the academic success of student-athletes may depend more on their choice of roommate(s) than the type of housing they occupy.

- Attributing greater importance to athletic grants for paying educational and living expenses is related to a decreased likelihood of being in the high academic group and, for females only, an increased likelihood of being in the low academic group. Although this finding is difficult to interpret, it suggests that athletic grants alone may not be sufficient to ensure academic success for student-athletes most at risk.

- Attending an institution with "high intensity" football and basketball programs, e.g., strong win/loss records against comparable teams, is related to a decreased likelihood of being in the high academic group and, for males only, an increased likelihood of being in the low academic group. Similarly, for male student-athletes, participating in a more competitive NCAA Division I conference, e.g., I-A versus I-AA, is significantly related to an increased likelihood of being in the low academic performance group. Why should a higher level of intercollegiate competition be related to lower academic performance? The present study cannot answer this question other than to suggest that the possible extra pressures and demands on students associated with highly competitive programs be a subject for special study at either the national or (individual) campus level.

Understanding Academic Performance: 1987-88 National Study of Intercollegiate Athletes

Long-standing debates among educators, college administrators, legislators, and the general public have focused on the college experiences and academic outcomes of students participating in intercollegiate athletics. The harshest critics contend that the academic potential of many student-athletes is severely compromised through exploitation of their athletic potential to increase college revenues. Areas of concern and debate include the effects of academic preparedness, sport-related time demands, campus and sports program characteristics, levels of financial support, and participation in revenue-generating or "big-time" sports (i.e., football and men's and women's basketball) on the academic performance of student-athletes[1].

What patterns of findings have emerged from prior research on the effects of intercollegiate sports participation on academic performance? If prior research in this area were viewed in terms of assessing the most "predictive risk factors" associated with the academic performance of student-athletes, the following sports-related and background factors would emerge: Participating in a "big time" sport, being male, being black, having a low high school GPA, and scoring low on the SAT (Purdy, Eitzen, and Hufnagel, 1982; Baumann and Henschen, 1986; Ervin, Saunders, Gillis, and Hogrebe, 1985; Kiger and Lorentzen, 1986). However, for reasons discussed below, our understanding of these risk factors is limited. Evidence of other potentially important risk factors, such as living in athletic dormitories, is less consistent and thus less well understood.

The goal of the present investigation is to gain a better understanding of the relationship between academic performance and intercollegiate sports participation. In addition to testing several hypotheses, e.g., that student-athletes who spend many hours pursuing their college sport and few hours preparing for class will be most likely to struggle academically, the study examines the magnitudes of effects of specific factors, e.g., course completion, finances, time demands, and athletics program characteristics, on students' academic performance.

Limitations of Prior Research

To date, concerns and debates about the academic performance of student-athletes have been difficult to resolve because of limitations on the knowledge base in this area. Specifically, prior research generally has:

(1) relied on samples of limited size or representativeness or on data sets that were designed for other purposes.

(2) employed analyses that do not statistically control for the potentially confounding influences of race, sex, type of sports, and school-level variability, e.g., school size,

location, prestige, and financial resources.

(3) relied on a single indicator of academic performance, e.g., cumulative grade point average (GPA).

(4) assumed that the effects on academic performance are linear, i.e., that predictive relationships are similar for the highest and lowest academic achievers.

These limitations are discussed in more detail below along with a brief outline of how the present study has addressed each issue.

Inadequate samples or data sets. Research on intercollegiate athletics has tended to examine students at single universities, across samples of universities that were not nationally representative, or through secondary analysis of national data bases which were not originally designed to focus on student-athlete issues. Each of these forms of research has limited our insight into the effects of intercollegiate athletics on academic performance.

Single university studies cannot examine possible effects on academic performance due to variation in institutional factors such as financial and educational resources, athletics program competitiveness, conference affiliation, and divisional status, or many other athletics related campus conditions -- like athletics dormitories. Studies based on samples of universities that are not nationally representative cannot provide reliable assessments of student-athletes' academic performance, let alone assessments of the possible effects on academic performance of variation in levels of competitiveness due to conference affiliation or membership in NCAA Division (e.g., Sack and Thiel, 1985). Finally, secondary data analysis of (often derived) student-athlete sub-samples in national education databases, e.g., National Longitudinal Study of the High School Class of 1972 (Adelman, 1990), typically include very little information regarding the sports-related college experiences of student-athletes. Instead, these studies tend to focus on relating demographic and admissions test data to college GPA, graduation, and post-graduation outcomes of student-athletes. For all of these reasons, links between academic performance and sports factors such as athletics-related time commitments, campus living conditions, coaching, recruitment, and financial assistance, have not been addressed in any comprehensive way.

The present investigation overcomes limitations associated with single campus studies, studies that are not nationally representative, and studies based on secondary analysis of national databases that are not focused on athletics by examining nationally representative data collected in 1987-88 for a national study designed specifically to address issues regarding the sports and education-related experiences of intercollegiate athletes.

Limited statistical controls. Some studies of the links between intercollegiate sports participation and students' academic performance have examined or controlled for

student-level demographic factors such as race and sex. Other studies have included students' socioeconomic status, college class standing, or type of sport. However, as Kiger and Lorentzen (1986) have observed, "A notable characteristic of this research is that it rarely integrates diverse correlates of academic performance among university athletes, such as gender, race, and type of sport" (p. 160). To overcome this limitation and reduce the possibility of statistical confounds due to the exclusion of important background influences, analyses in the present investigation assess and control for the effects of students' race, SES, college class standing, and type of sport on academic performance. Furthermore, to control for sex effects and allow for the possibility of different functional relationships among predictors and outcomes for men and women, analyses are performed separately for male and female student-athletes.

Just as a failure to statistically control for student-level demographic correlates of academic performance can bias results, failing to control for college-level correlates can be equally problematic. Substantial correlations have been found between college-level factors and academic achievement. For example, the proportion of college faculty with doctorates and college revenue per student have been found to correlate significantly with students' scores on the Graduate Record Examination, even when effects of pre-college achievement (student's scores on the Scholastic Aptitude Test) have been partialled out (Rock, Centra, & Linn, 1970). The present investigation addresses this issue in two ways: (1) for student-level analyses, college-level variation that might be associated with academic performance is statistically controlled by adjusting student case weight values, and (2) to assess the importance of specific college-level factors, the relationship between a set of college-level measures, e.g., NCAA Divisional status (I-A, I-AA, I-AAA), and students' academic performance is estimated.

Use of a single indicator of academic performance. Prior research on the effects of intercollegiate sports on academic performance has focused primarily on predicting a single measure of academic success; typically, it is college GPA (Purdy, Eitzen, & Hufnagel, 1982). Although GPA is an important indicator of performance, it does not capture other dimensions of academic performance, such as students' history of academic probation and missed classes (Schuman, Walsh, Olson, & Etheridge, 1985). The present investigation employs a more comprehensive academic outcome measure by classifying students on the basis of four indicators: (1) cumulative college GPA, (2) history of academic probation, (3) number of missed classes per week during the athletic season, and (4) number of missed classes per week out of season.

Assumption of linear effects. Studies that focus on college GPA as the outcome of interest typically assess the relationship between GPA and one or more predictor variables through correlation-based analyses, such as regression, in an effort to estimate the linear association between the predictor(s) and the outcome. An implicit assumption in this type of analysis is that the relationship between each predictor and the outcome measure is constant (i.e., linear) across all values of the outcome. For example, regressing GPA on "hours spent in sport" assumes that an additional hour of sports

participation has the same effect on student-athletes with GPAs of "D-" as it does for those with GPAs of "A-." Although the lowest and highest academic outcomes may be differentially related to any given predictor, this possibility is rarely tested. The present investigation overcomes this limitation by explicitly testing the assumption of linear effects on academic performance and using alternate forms of analysis when the assumption of linearity is not warranted.

Method

Sample

The sample for the present study consists of 2,818 student-athletes (n = 1,984 males and n = 834 females) enrolled at NCAA Division I institutions during the 1987-88 academic year. Each student participated in football, basketball, or another intercollegiate sport for which he or she received an athletic grant. The data are weighted to represent the population of approximately 54,000 similar student-athletes at NCAA Division I institutions nationwide.

This sample was drawn from the 1987-88 National Study of Intercollegiate Athletes conducted by the Center for the study of Athletics within the American Institutes for Research (AIR). The 1987-88 study sampled 80 full-time student-athletes (participating in football, basketball, and other intercollegiate sports) from each of 42 colleges and universities that were Division I members of the NCAA. The sample of 42 institutions (including 21 from Division I-A, 11 from Division I-AA, and 10 from Division I-AAA) reflected the variation in location, athletic conference affiliation, size, and public/private status of all 291 Division I institutions in the nation. More detailed descriptions of the sample and methodology employed in the 1987-88 national study are available in two AIR reports, *Methodology of the 1987-88 National Study of Intercollegiate Athletics* (Center for the Study of Athletics, 1988), and the *NCAA Guide to the National Study Data Base* (Center for the Study of Athletics, 1991).

Demographics of the sample. Tables 1 and 2 present a breakdown of the sample by sex, race (Black, White), and sport (football and basketball versus other intercollegiate sports). Table values **not** in parentheses refer to the weighted sample, which represents the population of student-athletes in NCAA Division I institutions participating in football, basketball, and other sports (who received grants) across the nation. Values in parentheses refer to the unweighted sample. Unless otherwise indicated, all statistical results will refer to the weighted sample.

Because minority races other than Black, e.g., Hispanic, Native American, Asian, and Pacific Islander, constituted less than 5% of this population of student-athletes, they could not be analyzed as distinct groups and were excluded from all analyses. Student-athletes who did not participate in football or basketball and did not receive an athletic grant were also excluded in order to focus on those students for whom intercollegiate athletics was most likely to be a integral part of college life.

Procedure

The dependent measure: Academic performance. A composite measure of objective academic performance was created from four variables: cumulative college GPA, history of academic probation at college, number of college classes missed per week during the student's athletic season, and number of college classes missed per week

Table 1
Male Student-Athletes
(Values in Parentheses are unweighted)

	Blacks		Whites	
	N	%	N	%
Football, basketball	10,450	86	14,401	52
	(688)	(92)	(859)	(70)
Other Sports	1,725	14	13,348	48
	(62)	(8)	(375)	(30)
Total	12,175	100	27,749	100
	(750)		(1,234)	

Table 2
Female Student-Athletes
(Values in Parentheses are unweighted)

	Blacks		Whites	
	N	%	N	%
Basketball	1,114	54	2,237	18
	(141)	(71)	(275)	(43)
Other Sports	964	46	10,133	82
	(57)	(29)	(361)	(57)
Total	2,078	100	12,370	100
	(198)		(636)	

out of season. Cutoff points on each of the four variables were chosen to reflect normative levels of high, moderate, and low academic performance, and to ensure sufficient sample sizes across the three categories of performance.

A student was categorized as "high" on academic performance if he or she had:

- a GPA of 2.5 or higher (on a four-point scale) AND
- never been on academic probation AND
- missed no more than one class per week (on average) in season AND
- missed no more than one class per week (on average) out of season.

A student was categorized as "low" on academic performance if he or she either had:

- a GPA of less than 2.0 AND
- been on academic probation,

OR had

- a GPA of less than 2.0 AND
- missed two or more classes per week (on average) in season AND
- missed two or more classes per week (on average) out of season.

A student was categorized as "moderate" on academic performance if he or she did not fall into either the "high" or "low" group.

For male student-athletes, these criteria resulted in 13.6% being categorized as "high", 58.1% as "moderate", and 28.3% as "low" on academic performance. For the female student-athletes, 26.3% were categorized as "high", 53.8% as "moderate", and 19.9% as "low" on academic performance.

The independent measures: The independent measures were grouped into a set of control variables and eight sets of predictors related to (1) time commitments, (2) perceptions of athletic staff, (3) finances, (4) academic preparedness, (5) course difficulties, (6) living arrangements, (7) recruitment, and (8) campus-level factors, e.g., divisional status of the institution.

Control variables, 4 items: The set of four control variables included student's RACE (1=black, 2=white), SPORT (1=football or basketball, 2= other intercollegiate sport), CLASS (1=freshman to 5=graduate student), and SES (an average of the standardized values for father's occupation[2], father's education, mother's education, and family's annual income, such that high values indicated high socioeconomic status).

Time commitments, 4 items: Each item refers to the average hours per week, in and out of season, including weekends, reported by the student-athlete. SPORT_HR -- hrs/wk spent "doing things related to your main sport," PREP_HR -- hrs/wk "preparing for class," SOC_HR -- hrs/wk "in social activities (including 'hanging out')," and CLASS_HR -- hrs/wk "in class and lab."

Perceptions of athletic staff, 2 items: STAFF -- "Overall, how satisfied are you with the way the coaching staff of your main sport has helped you improve as an athlete?" 1="totally satisfied" to 4="not satisfied at all." DIRECTOR -- an overall rating regarding how well the coach does or knows the following things: knows what life on campus is like for players; tries to help players with health problems; listens to players' problems not related to athletics; encourages players to do well in their courses; and keeps track of how well players are doing in their courses, 1="excellently" to 4="terribly."

Finances, 8 items: GRANTNOW -- "Do you currently receive an athletic grant?" (1="yes," 2="no"). GRANTTHT -- "Have you ever been threatened with a reduction in or loss of your grant?" (1="yes," 2="no"). WORKSTUD -- "Do you work at a paid job, or a job that provides you with benefits (e.g., meals), at any time during the academic year (include work study)?" (1="yes," 2="no"). PAYGRANT -- "how important are athletic grants for paying your educational and living expenses this term? (1="of greatest importance" to 4="not important at all"). PAYJOBS -- "how important are jobs (during the summer or during the academic year) for paying your educational and living expenses this term? (1="of greatest importance" to 4="not important at all"). BORROW -- "Since entering college, how much money have you or your parents had to borrow to pay for expenses directly related to your education? Include only loans from the government or from private financial institutions" (measured in 14 $2,000 to $4,000 intervals up to "$35,000 or more"). AFTEREXP -- "About how much money do you have per month, after expenses for your room, food, tuition, fees, and course-related books?" (measured in 11 $50 to $100 intervals up to "$751 or more"). ADEQCASH -- "Is the amount of money you have per month after college expenses adequate?" (1="yes", 2="no").

Academic preparedness, 2 items: SATCOMP -- is the students' actual SAT comprehensive score (sum of both parts of the SAT). HSGPA -- is the student's self-reported high school GPA, where 1= "A or A+," 2="A-," ... 8="C- or below."

Course difficulties, 3 items: SCHLREP -- "At this school, have you repeated one or more courses?" (1="yes," 2="no"). SCHLINC -- "At this school, have you received 'incomplete' grades for courses in one or more terms?" (1="yes," 2="no"). SCHLSUM -- "At this school, have you attended one or more summer sessions?" (1="yes," 2="no").

Living arrangements, 2 items: ROOMIE -- Do you room with a teammate or other student-athletes? (1="yes", 2="no"). ATH_HOUSE -- Do you live in school-owned housing with mostly other student-athletes (1="yes", 2="no").

Recruitment, 4 items: RCT_PROB -- "The information I got during recruitment was misleading and caused me serious problems," (1="strongly agree" to 4="strongly disagree.") RCT_CHOSE -- "The information I got during recruitment helped me make the right college choice," (1="strongly agree" to 4="strongly disagree.") RCT_BAD -- "Being recruited was a very unpleasant experience," (1="strongly agree" to 4="strongly

disagree.") RCT_SUM -- is the sum of the following seven recruitment activities that the student reported: family received letters, family received telephone calls, school paid for the family visit to the school, family home was visited by a recruiter, family attended special events, family received personal gifts, news media reported on the student's recruitment.

Campus-level factors, 3 items: DIVISION -- the NCAA Division I status of the campus, where 1="I-A," 2="I-AA," and 3="I=AAA." BLKENR -- for each campus, the proportion of the entire student enrollment who are Black. INTENSITY[3] -- a variable used to measure the relative intensity, or "success-competitiveness," of an institution's athletic program, among the 42 institutions included in the National Study.

INTENSITY is a measure that reflects a team's win-loss record, strength of competition, and a diminishing returns principle that prevents a team from building up its rating by running up large margins of victory against weak teams. It is based on the Sagarin ratings for all NCAA Division I men's football and basketball teams (Sagarin, 1986). The final Sagarin computer football ratings are published in *USA Today* each January 3, and the final basketball ratings are published the week after the NCAA men's basketball tournament is completed. For the national study and for the present investigation, INTENSITY was derived for each institution as an unweighted average of the 1987-88 final basketball and football ratings, the 1985-86 final ratings for football, and the 1984-85 final ratings for basketball. If a team was above the median of the average of these ratings, it was labeled "more successfully-competitive." If a team was below the median of the average, it was labeled "less successfully-competitive."

Analytic model. Because the outcome measure consists of three ordered categories (low, moderate, and high academic performance), a logistic regression approach was employed. In accordance with this approach a test of equal linear association between the predictors and different levels of the dependent measure is used to address the "proportional odds assumption[4]," i.e., that the regression slope parameters that distinguish the low academic performance level from the two higher levels are comparable to the slope parameters that distinguish the high level from the two lower levels. For the present investigation, a statistically significant result from this test indicates the inappropriateness of using the linear three-level form of the dependent measure (with respect to a set of predictors in a model being tested). Such a result would further suggest the need to examine the differential importance of predictor variables for high and low academic performance.

For tests of the proportional odds assumption and all subsequent analyses, academic performance is regressed on each of the eight sets of predictor variables. Each analysis includes the set of control variables. Analyses for male and female student athletes are performed separately.

Results of the proportional odds test. The proportional odds test statistic is

known to have a chi-square distribution. Sixteen tests (i.e., 8 predictor sets tested separately for males and females) were performed in which the degrees of freedom ranged from 6 to 12. The assumption of proportional odds is rejected, at $p<.05$ level, for resulting chi square statistics greater than 21. Of the 16 tests performed, the smallest resulting chi-square statistic is 116. This suggests the appropriateness of modelling academic performance as two dichotomous measures, (1) low versus moderate and high (combined) and (2) low and moderate (combined) versus high, in order to capture the differential importance of predictor variables for high and low academic performance.

Testing "goodness of fit." For each logistic regression model analyzed, a goodness-of-fit measure is calculated to assess the appropriateness of the model with respect to the data. The fit measure assessed is the "-2 Log Likelihood" statistic, which has a chi-square distribution under the null hypothesis that all the predictor and control variables in a given model are zero.

Controlling for institution-level variation. For analyses that focus on student-level factors, institution-level variation related to academic performance is controlled by modifying case weight values on the data file. Case weights are modified so that the sum of the weights corresponding to the 42 institutions will be equivalent within each level of the dependent measure of academic performance.

Effective sample size. To calculate accurate statistical tests using weighted data, an "effective n" must be used that takes into account the sample size relative to the population size. Using the effective n assures that the results of statistical tests do not overestimate statistical significance. The effective n for a weighted sample is equal to the ratio of the square of the sum of weights to the sum of the square of the weights (Kish, 1965). In the present investigation, tests of statistical significance, e.g., to assess the importance of individual predictors, employ an effective n[5].

Interpreting parameter estimates. For logistic regression analyses that include a dichotomous dependent measure, e.g., low versus moderate and high academic performance, an unstandardized parameter estimate (for a given predictor variable in the model) is expressed as a logit and can be evaluated in terms of the likelihood that an observation (i.e., a student-athlete) will be in one of the two categories of the dependent measure. In all analyses, one level of the dependent measure will be referred to as the "reference" category and the other level as the "target" category.

Statements of likelihood will always refer to the probability of being in the target category. In the "low versus moderate and high" dichotomy, the low academic performance level will be the target category. In the "high versus moderate and low" dichotomy, the high level will be the target category. Thus, a parameter estimate for a predictor variable can be evaluated as follows: *a one unit increase in the level of the predictor variable will correspond to a proportional increase in the likelihood, i.e., "risk", of an observation being in the target category of the dependent measure.* The proportional

change is equal to e^{logit}, which is $e^{parameter\ estimate}$. A positive parameter estimate indicates an increase in likelihood, a negative parameter indicates a decrease in likelihood. For the remainder of this paper, the proportional change factor will be referred to as a *"risk multiplier."* Similar to other regression approaches, the estimated parameter effect for a given predictor is partialled on other independent variables in the model. Statistical significance tests are calculated for all parameter estimates.

Here is an example (not an actual result) using one control variable, SES, and two predictor variables, SPORT_HR and PREP_HR. Academic performance is modelled as a dichotomy, low versus moderate and high (which means that "low" is the target category), and is regressed on SES, SPORT_HR, and PREP_HR. The resulting logistic parameter estimates are 0.2 for SPORT_HR and -0.2 for PREP_HR and are each determined to be statistically significant at $p<.01$. In this hypothetical case, controlling for a student-athlete's SES and time spent preparing for class, an additional hour of sport activity during the week would increase the likelihood of that individual being in the low academic performance category by a factor of $e^{0.2}=1.22$, i.e., 1.22 is the risk multiplier. The risk multiplier can be applied to a student at any prior likelihood level. For example, if a student had a prior likelihood of 50% for being in the low academic group (i.e., already had a 50% chance of being in the low academic group), an extra hour per week of sport activity would raise that likelihood to 61%, which is 50 times 1.22 . If the student had a prior likelihood of only 4%, the extra hour per week of sport activity would only raise that likelihood to about 4.9% (i.e., 4 times 1.22).

Because the parameter estimate for PREP_HR is negative, an additional hour of preparation per week would reduce the likelihood of being in the low academic outcome group by a factor of $e^{-0.2}=0.83$. Thus, for a student with a prior low group likelihood of 50%, an extra hour of academic preparation per week (controlling for SES and time spent on sports) would reduce that likelihood to 41.5% (i.e., 50 times 0.83). To estimate the effect of four extra hours of academic preparation per week, the parameter estimate should be multiplied by 4.0, i.e., -0.2 times 4.0 = -0.8 . Because $e^{-0.8}=.45$, a student with a prior low group likelihood of 50% who spends an extra four hours of academic preparation per week would reduce that likelihood to 22.5% (i.e., 50 times 0.45).

Finally, although a reported parameter estimate and risk multiplier represent the change in likelihood associated with an increase in a given predictor value, it is possible to also represent the change associated with a decrease in a given predictor value by reversing the sign of the reported parameter estimate and recalculating the risk multiplier, i.e., $e^{new\ estimate}$.

Results

Descriptive statistics

Tables 3 and 4 provide descriptive statistics for the control variables and predictor variables (grouped by set), separately for male and female student-athletes.

Effects of the control variables in the logistic regressions

Race. For male and female student-athletes, race is consistently related to both the high and low academic performance categories. As compared to White student-athletes, Blacks are more likely to be in the low academic performance group and less likely to be in the high academic performance group. The direction of these effects are consistent across the eight logistic regression models (presented below) although, in a few cases, the effect is not statistically significant.

Sport. For male student-athletes, participation in "revenue sports," i.e., football or basketball, rather than other intercollegiate sports, is consistently related to an increased risk of being in the low academic group and a decreased likelihood of being in the high academic group. For female student-athletes, participation in a revenue sport is similarly related to a decreased likelihood of being in the high academic group but not significantly related to the likelihood of being in the low academic group.

Class. For male student-athletes, in seven of the eight regression models, being an upperclassman decreases the likelihood of being in the high academic group but is not significantly related to the likelihood of being in the low academic group. In contrast, for female student-athletes, having a higher class standing consistently decreases the likelihood of being in the low academic group. The relationship between college class and being in the high academic group is mixed for females -- in some cases it is consistent with the effect found for males, in other cases there is no significant relationship.

SES. For male and female student-athletes, SES is not consistently related with the likelihood of being in either the high or low academic performance group. In the majority of cases, the effect of SES is not statistically significant. In a few cases, the effects are significant although small and inconsistent.

Time commitments

Sport_Hr. For male and female student-athletes, time spent on athletics is not significantly related to being in the low academic performance group.

For male and female student-athletes, greater time spent on athletics is significantly related to a decreased likelihood of being in the high academic performance group. For example, for a male student-athlete with a prior likelihood of 50% for being

Table 3
Descriptive statistics for male student-athletes

Variable	Label	Minimum	Maximum	Mean	Std Dev
Control					
RACE	1=Black vs 2=White	1.0	2.0	1.7	0.5
SPORT	1=F/B-ball vs 2=Other athlete w/grant	1.0	2.0	1.4	0.5
CLASS	College class standing	1.0	5.0	2.4	1.1
SES	SES--from family income, occupation, educ.	32.7	66.2	49.1	8.0
Time					
SPORT_HR	Hrs/wk (in & out of season) on sport	0.0	84.0	22.8	11.7
PREP_HR	Hrs/wk (in & out of season) on class prep	0.0	53.5	12.6	5.9
SOC_HR	Hrs/wk (in & out of season) socializing	0.0	64.5	12.3	8.5
CLASS_HR	Hrs/wk (in & out of season) in class	0.0	77.0	13.8	6.6
Athletic Staff					
STAFF	Satisfaction with coaching staff	1.0	4.0	2.1	0.9
DIRECTOR	Rating of coach's performance	1.0	4.0	2.0	0.7
Finances					
GRANTNOW	Athletic grant currently received	1.0	2.0	1.2	0.4
GRANTTHT	Threatened with grant reduction	1.0	2.0	1.9	0.3
WORKSTUD	Work for pay during academic year	1.0	2.0	1.9	0.3
PAYGRANT	Importance of grant for paying expenses	1.0	4.0	1.8	1.2
PAYJOBS	Importance of job for paying expenses	1.0	4.0	2.4	1.2
BORROW	Amount of money borrowed for school	0.0	37000.0	1661.3	3752.7
AFTEREXP	Amount of money/month after expenses	0.0	800.0	96.4	120.3
ADEQCASH	Adequacy of money/month after expenses	1.0	2.0	1.5	0.5
Academic Preparation					
SATCOMP	Combined SAT score (from transcript)	420.0	1500.0	863.0	183.2
HSGPA	Reported HS Grade point average	1.0	8.0	4.3	1.8
Courses					
SCHLREP	Repeated one or more courses	1.0	2.0	1.6	0.5
SCHLINC	Received one or more incomplete grades	1.0	2.0	1.8	0.4
SCHLSUM	Attended summer sessions	1.0	2.0	1.7	0.5
Housing					
ROOMIE	Roommate is teammate or other athlete	1.0	2.0	1.4	0.7
ATHHSG	Lives with mostly other student-athletes	1.0	2.0	1.7	0.7
Recruiting*					
RCT_PROB	Recruitment caused problems for student	1.0	4.0	3.1	0.8
RCT_CHOSE	Recruitment helped choice of college	1.0	4.0	2.1	0.8
RCT_BAD	Recruitment was a bad experience	1.0	4.0	3.4	0.7
RCRT_SUM	Sum of recruitment experiences/activities	0.0	7.0	4.5	1.5
Institution					
DIVISION	NCAA Division (I-A, I-AA, I-AAA)	1.0	3.0	1.7	0.8
BLKENR	Percentage of Black students on campus	0.0	0.9	0.1	0.2
INTENSITY	Competiveness of football/basketball program	0.0	1.0	0.4	0.5

*The sample N for recruitment variables is 8% lower than the sample N for other variables due to the exclusion of male student-athletes who were not recruited.

Table 4
Descriptive statistics for female student-athletes

Variable	Label	Minimum	Maximum	Mean	Std Dev
Control					
RACE	1=Black vs 2=White	1.0	2.0	1.9	0.4
SPORT	1=Basketball vs 2=Other athlete w/grant	1.0	2.0	1.8	0.4
CLASS	College class standing	1.0	5.0	2.3	1.1
SES	SES--from family income, occupation, educ.	32.7	67.9	51.1	7.6
Time					
SPORT_HR	Hrs/wk (in & out of season) on sport	0.5	84.0	20.6	11.4
PREP_HR	Hrs/wk (in & out of season) on class prep	1.5	43.5	13.6	5.8
SOC_HR	Hrs/wk (in & out of season) socializing	0.0	49.5	11.6	7.0
CLASS_HR	Hrs/wk (in & out of season) in class	0.0	77.0	14.8	6.1
Athletic Staff					
STAFF	Satisfaction with coaching staff	1.0	4.0	2.3	1.0
DIRECTOR	Rating of coach's performance	1.0	4.0	2.0	0.8
Finances					
GRANTNOW	Athletic grant currently received	1.0	2.0	1.1	0.3
GRANTTHT	Threatened with grant reduction	1.0	2.0	1.8	0.4
WORKSTUD	Work for pay during academic year	1.0	2.0	1.8	0.4
PAYGRANT	Importance of grant for paying expenses	1.0	4.0	1.6	1.0
PAYJOBS	Importance of job for paying expenses	1.0	4.0	2.3	1.2
BORROW	Amount of money borrowed for school	0.0	37000.0	1898.0	4038.9
AFTEREXP	Amount of money/month after expenses	0.0	800.0	109.2	122.1
ADEQCASH	Adequacy of money/month after expenses	1.0	2.0	1.4	0.5
Academic Preparation					
SATCOMP	Combined SAT score (from transcript)	465.0	1430.0	881.3	168.8
HSGPA	Reported HS Grade point average	1.0	8.0	3.5	1.7
Courses					
SCHLREP	Repeated one or more courses	1.0	2.0	1.7	0.4
SCHLINC	Received one or more incomplete grades	1.0	2.0	1.9	0.3
SCHLSUM	Attended summer sessions	1.0	2.0	1.7	0.4
Housing					
ROOMIE	Roommate is teammate or other athlete	1.0	2.0	1.5	0.7
ATHHSG	Lives with mostly other student-athletes	1.0	2.0	1.9	0.7
Recruiting*					
RCT_PROB	Recruitment caused problems for student	1.0	4.0	3.3	0.8
RCT_CHOSE	Recruitment helped choice of college	1.0	4.0	2.1	0.8
RCT_BAD	Recruitment was a bad experience	1.0	4.0	3.5	0.7
RCRT_SUM	Sum of recruitment experiences/activities	0.0	7.0	4.0	1.3
Institution					
DIVISION	NCAA Division (I-A, I-AA, I-AAA)	1.0	3.0	1.8	0.9
BLKENR	Percentage of Black students on campus	0.0	0.9	0.1	0.2
INTENSITY	Competiveness of football/basketball program	0.0	1.0	0.5	0.5

*The sample N for recruitment variables is 4% lower than the sample N for other variables due to the exclusion of female student-athletes who were not recruited.

Table 5

Effects of Time Commitments on Academic Performance

Logistic parameter estimate (risk multiplier)

	Male student-athletes		Female student-athletes	
	Predicting "low" group status	Predicting "high" group status	Predicting "low" group status	Predicting "high" group status
Control variables				
Race	-0.309 (0.734)**	0.833 (2.300)**	-0.422 (0.656)*	0.733 (2.081)**
Sport	-0.332 (0.717)**	0.333 (1.395)**	0.031 (1.031)	0.458 (1.581)**
Class	0.025 (1.025)	-0.102 (0.903)**	-0.223 (0.800)**	-0.018 (0.982)
SES	0.007 (1.007)*	0.002 (1.002)	0.009 (1.009)	0.001 (1.001)
Predictors[a]				
Sport_Hr	0.014 (1.014)	-0.056 (0.946)**	0.007 (1.007)	-0.030 (0.970)*
Prep_Hr	-0.204 (0.815)**	0.118 (1.125)**	-0.266 (0.766)**	0.056 (1.058)
Soc_Hr	0.095 (1.100)**	-0.119 (0.888)**	0.102 (1.107)**	0.004 (1.004)
Class_Hr	0.043 (1.044)*	-0.023 (0.977)	0.076 (1.079)	0.046 (1.047)

* p< .05

** p< .01

[a]Results represent a four hours per week unit of each predictor

in the high academic group, an increase of 4 hours/week on athletics would lower that likelihood to 47.3%. An increase of 8 hours/week would lower the likelihood to 44.7%.

Prep_Hr. For male and female student-athletes, greater time spent on class preparation is significantly related to a decreased likelihood of being in the low academic performance group. For example, for a female student-athlete with a prior likelihood of 50% for being in the low academic group, an increase of 4 hours/week on class preparation would lower that likelihood to 38.3%. An increase of 8 hours/week would lower the likelihood to 29.4%.

For males only, greater time spent preparing for class significantly increased the likelihood of being in the high academic group.

Soc_Hr. For male and female student-athletes, greater time spent on socializing is significantly related to an increased likelihood of being in the low academic performance group. For example, for a male student-athlete with a prior likelihood of 50% for being in the low academic group, an increase of 4 hours/week of socializing would increase that likelihood to 55.0%. An increase of 8 hours/week would increase the likelihood to 60.5%.

For males only, greater time spent on socializing significantly decreased the likelihood of being in the high academic group.

Class_Hr. For female student-athletes, class time is not significantly related to academic performance. For males, greater class time is not related to being in the high academic group but weakly related to being in the low academic group.

Athletic staff

Director. For male and female student-athletes, favorable rating of the coaches performance in helping and encouraging students academically is significantly related to an increased likelihood of being in the high academic performance group.

Similarly, for male and female student-athletes, favorable rating of the coaches performance is related to a decreased likelihood of being in the low academic performance group, although this relationship is not statistically significant for females.

Staff. For male and female student-athletes there is no significant relation between satisfaction with the coaching staff ability to help students improve as athletes and the likelihood of being in the high academic performance group.

Other results for the "Staff" predictor are inconsistent. For female student-athletes, favorable rating of the coaching staff is related to an increase in the likelihood of being in the high academic group. For males, the relationship is reversed.

Table 6

Effects of Athletic Staff on Academic Performance

Logistic parameter estimate (risk multiplier)

	Male student-athletes		Female student-athletes	
	Predicting "low" group status	Predicting "high" group status	Predicting "low" group status	Predicting "high" group status
Control variables				
Race	-0.270 (0.763)**	0.807 (2.241)**	-0.432 (0.649)*	0.775 (2.171)**
Sport	-0.367 (0.693)**	0.298 (1.347)**	0.058 (1.060)	0.416 (1.516)**
Class	0.002 (1.002)	-0.100 (0.905)**	-0.206 (0.814)**	-0.053 (0.948)*
SES	0.006 (1.006)	0.004 (1.004)	0.009 (1.009)	0.002 (1.002)
Predictors				
Director	0.187 (1.206)**	-0.253 (0.776)**	0.128 (1.137)	-0.265 (0.767)**
Staff	-0.188 (0.829)**	-0.026 (0.974)	0.230 (1.259)**	0.040 (1.041)

* p< .05
** p< .01

Finances

Grantnow. For male and female student-athletes, currently having an athletic grant or scholarship is not significantly related to academic performance.

Granttht. For male and female student-athletes, having their athletic grant threatened (re: reduction or loss), is significantly related to an increase in the likelihood of being in the low academic group and a decrease in the likelihood of being in the high academic group.

Workstud. Work-study status is not significantly related to academic performance for female student-athletes. For males, participating in work-study projects is related to an increase in the likelihood of being in the high academic group but not significantly related to being in the low academic group.

Paygrant. For male and female student-athletes, reporting that athletic grants are important for paying their educational and living expenses is related to a decrease in the likelihood of being in the high academic group and, for females only, an increase in the likelihood of being in the low academic group.

Payjobs. Results for this predictor are inconsistent. For male student-athletes, reporting that a paid job is important for paying educational and living expenses is related to an increase in the likelihood of being in the low academic group, but not significantly related to being in the high academic group. For females, reporting that a paid job is important is related to an increase in the likelihood of being in the high academic group, but not significantly related to being in the low academic group.

Borrow. The amount of money student-athletes and their families borrowed for college expenses is not significantly related to academic performance, with one exception -- for female student athletes, greater borrowing is related to an increase in the likelihood of being in the low academic group.

Afterexp. For male and female student-athletes, greater amounts of money available each month, after paying educational and living expenses, is significantly related to an increase in the likelihood of being in the low academic performance group and a decrease in the likelihood of being in the high academic group. For example, for a female student-athlete with a prior likelihood of 50% of being in the low academic group, having an extra $100 available after college expenses is related to an increase in the low group likelihood to 60.5%.

Adeqcash. For male and female student-athletes, reporting that the amount of money available each month, after paying educational and living expenses, is "inadequate" (rather than adequate) is significantly related to an increase in the likelihood of being in the low academic performance group and a decrease in the likelihood of being in the high academic group. For example, for a male student-athlete

Table 7

Effects of Financial Conditions on Academic Performance

Logistic parameter estimate (risk multiplier)

	Male student-athletes		Female student-athletes	
	Predicting "low" group status	Predicting "high" group status	Predicting "low" group status	Predicting "high" group status
Control variables				
Race	-0.262 (0.770)**	0.681 (1.976)**	-0.420 (0.657)*	0.726 (2.067)**
Sport	-0.280 (0.756)**	0.331 (1.392)**	-0.075 (0.928)	0.439 (1.551)**
Class	-0.024 (0.976)	-0.067 (0.935)**	-0.256 (0.774)**	-0.016 (0.984)
SES	0.009 (1.009)**	0.005 (1.005)	0.015 (1.015)	0.001 (1.001)
Predictors				
Grantnow	-0.125 (0.882)	0.012 (1.012)	-0.339 (0.712)	-0.156 (0.856)
Granttht	-0.242 (0.785)**	0.515 (1.674)**	-0.431 (0.650)**	0.524 (1.689)**
Workstud	0.025 (1.025)	-0.241 (0.786)**	-0.258 (0.773)	0.056 (1.058)
Paygrant	0.008 (1.008)	0.105 (1.111)**	-0.168 (0.845)*	0.209 (1.232)**
Payjobs	-0.105 (0.900)**	-0.027 (0.973)	0.008 (1.008)	-0.087 (0.917)**
Borrow[a]	-0.000 (1.000)	-0.000 (1.000)	0.049 (1.050)**	-0.010 (1.010)
Afterexp[b]	0.067 (1.069)**	-0.169 (0.845)**	0.190 (1.209)**	-0.149 (0.862)**
Adeqcash	0.387 (1.473)**	-0.508 (0.602)**	0.346 (1.413)**	-0.185 (0.831)**

* $p < .05$

** $p < .01$

[a]Results for this predictor represent $1,000 units

[b]Results for this predictor represent $100 units

with a prior likelihood of 50% of being in the low academic group, reporting that the *money after paying college expenses is inadequate* is related to an increase in the low group likelihood to 73.7%.

Academic preparedness

SATcomp. For male and female student-athletes, the combined math and verbal SAT score is not significantly related to the likelihood of being in the low academic performance group.

For male and female student-athletes, high combined SAT scores are significantly related to an increase in the likelihood of being in the high academic performance group. For example, for a female student-athlete with a prior likelihood of 50% of being in the high academic group, an additional 100 SAT points[6] is related to an increase in that likelihood to 61.1%.

HSGPA. For male and female student-athletes, having a good high school grade point average is significantly related to an increase in the likelihood of being in the high academic performance group and a decrease in the likelihood of being in the low academic group. For example, for a male student-athlete with a prior likelihood of 50% of being in the low academic performance group, having a one point lower high school GPA (e.g., "C-" instead of "B-") is related to an increase in the likelihood of being in the low academic group to 79.8%.

Courses

Schlrep. For male student-athletes, repeating one or more courses is significantly related to an increase in the likelihood of being in the low academic performance group and a decrease in the likelihood of being in the high academic performance group. The relationship is similar for female student-athletes although the low group prediction is not statistically significant.

Schlinc. For male and female student-athletes, taking one or more "incomplete" grades is significantly related to an increase likelihood of being in the low academic performance group and a decreased likelihood of being in the high academic performance group. For example, for a female student-athlete with a prior likelihood of 50% of being in the low academic group, not taking any grades of "incomplete" is related to a decrease in the likelihood of being in the low academic group to 24.6%.

Schlsum. For male student-athletes, attending summer session classes is not significantly related to academic performance. For female student-athletes, attending summer classes is significantly related to an increase in the likelihood of being in the high academic group, but not significantly related to the likelihood of being in the low academic group.

Table 8

Effects of Academic Preparedness on Academic Performance

Logistic parameter estimate (risk multiplier)

	Male student-athletes		Female student-athletes	
	Predicting "low" group status	Predicting "high" group status	Predicting "low" group status	Predicting "high" group status
Control variables				
Race	-0.105 (0.900)	0.461 (1.586)**	-0.154 (0.857)	0.286 (1.331)**
Sport	-0.327 (0.721)**	0.267 (1.306)**	0.053 (1.054)	0.426 (1.531)**
Class	0.019 (1.019)	-0.096 (0.908)**	-0.018 (0.982)**	-0.156 (0.856)**
SES	0.012 (1.012)**	-0.005 (0.995)	0.018 (1.018)*	-0.013 (0.987)**
Predictors				
SATcomp	-0.000 (1.000)	0.001 (1.001)**	-0.001 (0.999)	0.002 (1.002)**
HSGPA	0.160 (1.174)**	-0.156 (0.856)**	0.185 (1.203)**	-0.326 (0.722)**

* p< .05
** p< .01

Table 9

Effects of Course Difficulties on Academic Performance

Logistic parameter estimate (risk multiplier)

	Male student-athletes		Female student-athletes	
	Predicting "low" group status	Predicting "high" group status	Predicting "low" group status	Predicting "high" group status
Control variables				
Race	-0.115 (0.891)*	0.583 (1.791)**	-0.322 (0.725)	0.557 (1.745)**
Sport	-0.276 (0.759)**	0.286 (1.331)**	0.102 (1.107)	0.415 (1.514)**
Class	-0.062 (0.940)**	-0.001 (0.999)	-0.237 (0.789)**	-0.015 (0.985)
SES	0.013 (1.013)**	-0.008 (0.992)**	0.015 (1.015)	-0.001 (0.999)
Predictors				
Schlrep	-0.651 (0.522)**	0.653 (1.921)**	-0.218 (0.804)	0.741 (2.098)**
Schlinc	-0.450 (0.638)**	0.927 (2.527)**	-0.712 (0.491)**	1.547 (4.697)**
Schlsum	0.011 (1.011)	0.078 (1.081)	-0.086 (0.918)	-0.049 (0.952)*

* $p < .05$

** $p < .01$

Housing

Roomie. For male and female student-athletes, having one or more roommates who are teammates or other student-athletes is significantly related to an increase in the likelihood of being in the low academic performance group and a decrease in the likelihood of being in the high academic group. The strength of this relationship appears stronger for females than for males.

Athhsg. In contrast to the results for "Roomie", for male and female student-athletes, living in school owned housing with mostly other student-athletes is not significantly related to academic performance.

Recruiting

Rct_prob. For male student-athletes, endorsing the statement, "the information I got during recruitment was misleading and caused serious problems" is significantly related to an increase in the likelihood of being in the low academic performance group and a decrease in the likelihood of being in the high academic performance group. For female student-athletes, this variable is not significantly related to academic performance.

Rct_chose. For male student-athletes, endorsing the statement, "the information I got during recruitment helped me make the right college choice" is significantly related to a decrease in the likelihood of being in the low academic performance group and an increase in the likelihood of being in the high academic group. For female student-athletes, this variable is not significantly related to academic performance.

Rct_bad. Results for this variable are inconsistent. For male student-athletes, endorsing the statement, "being recruited was a very unpleasant experience" is significantly related to a decrease in the likelihood of being in the low academic performance group as well as a decrease in the likelihood of being in the high academic group. For female student-athletes, this variable is not significantly related to academic performance.

Rct_sum. For male and female student-athletes, being recruited through a variety of activities, e.g., letters, phone calls, visits, is significantly related to an increase in the likelihood of being in the low academic performance group and a decrease in the likelihood of being in the high academic group.

Institutional factors

Division. For male student-athletes, participating in a more competitive NCAA Division I conference, e.g., I-A versus I-AA, is significantly related to an increased likelihood of being in the low academic performance group, but not significantly related

Table 10

Effects of Athletic Housing on Academic Performance

Logistic parameter estimate (risk multiplier)

	Male student-athletes		Female student-athletes	
	Predicting "low" group status	Predicting "high" group status	Predicting "low" group status	Predicting "high" group status
Control variables				
Race	-0.269 (0.764)**	0.772 (2.164)**	-0.334 (0.716)*	0.726 (2.067)**
Sport	-0.339 (0.712)**	0.303 (1.354)**	0.044 (1.045)	0.433 (1.542)**
Class	0.025 (1.025)	-0.116 (0.890)**	-0.233 (0.792)**	-0.035 (0.966)
SES	0.006 (1.006)	0.002 (1.002)	0.011 (1.011)	-0.001 (0.999)
Predictors				
Roomie	-0.180 (0.835)**	0.092 (1.096)**	0.647 (1.910)**	-0.202 (0.817)**
Athhsg	0.105 (1.111)	0.050 (1.051)	-0.105 (0.900)	0.090 (1.094)

* p< .05

** p< .01

Table 11

Effects of Athletic Recruitment on Academic Performance

Logistic parameter estimate (risk multiplier)[a]

	Male student-athletes		Female student-athletes	
	Predicting "low" group status	Predicting "high" group status	Predicting "low" group status	Predicting "high" group status
Control variables				
Race	-0.224 (0.799)**	0.576 (1.779)**	-0.342 (0.710)	1.038 (2.824)**
Sport	-0.217 (0.805)**	0.033 (1.034)	0.006 (1.006)	0.307 (1.359)**
Class	0.014 (1.014)	-0.118 (0.889)**	-0.180 (0.835)**	-0.071 (0.931)*
SES	0.009 (1.009)**	0.003 (1.003)	0.001 (1.001)	0.006 (1.006)
Predictors				
Rct_prob	-0.210 (0.811)**	0.499 (1.647)**	0.112 (1.119)	-0.093 (0.911)
Rct_chose	0.116 (1.123)**	-0.075 (0.928)*	-0.049 (0.952)	0.027 (1.027)
Rct_bad	0.105 (1.111)**	0.248 (1.281)**	-0.155 (0.856)	0.101 (1.106)
Rct_sum	0.039 (1.040)*	-0.148 (0.862)**	0.110 (1.116)*	-0.226 (0.798)**

* p< .05

** p< .01

[a]The sample N for these estimates is lower than the sample N for other results due to the exclusion of student-athletes who were not recruited (approximately 8% of males and 4% of females).

Table 12

Effects of Institutional Factors on Academic Performance

Logistic parameter estimate (risk multiplier)

	Male student-athletes		Female student-athletes	
	Predicting "low" group status	Predicting "high" group status	Predicting "low" group status	Predicting "high" group status
Control variables				
Race	-0.199 (0.820)**	1.056 (2.875)**	-0.528 (0.590)**	1.455 (4.284)**
Sport	-0.471 (0.624)**	0.390 (1.477)**	0.060 (1.062)	0.192 (1.212)*
Class	0.027 (1.027)	-0.129 (0.879)**	-0.219 (0.803)**	-0.001 (0.999)
SES	0.005 (1.005)*	0.009 (1.009)**	0.011 (1.011)*	-0.009 (0.991)*
Predictors				
Division	-0.140 (0.869)**	0.015 (1.015)	0.078 (1.081)	0.163 (1.177)**
Bikenr	-0.122 (0.885)	-0.322 (0.725)	-0.379 (0.685)	0.905 (2.472)**
Intensity	0.108 (1.114)**	-0.452 (0.636)**	-0.135 (0.874)	-0.251 (0.778)**

* p< .05
** p< .01

to being in the high academic group. For a male student-athlete with a prior likelihood of 50% of being in the low academic group, competing in Division I-A rather than I-AA is related to an increase in that likelihood to 57.5%.

For female student-athletes, participating in a more competitive NCAA Division I conference is significantly related to an decreased likelihood of being in the high academic performance group, but not significantly related to being in the low academic group.

Blkenr. For male student-athletes, the percentage of Black students at their institution is not significantly related to academic performance. For female student-athletes, a greater percentage of Black students is significantly related to an increase in the likelihood of being in the high academic performance group, but not significantly related to being in the low academic group.

Intensity. For male student-athletes, attending an institution with "high intensity" football and basketball programs, e.g., strong win/loss records against comparable teams, is significantly related to an increase in the likelihood of being in the low academic performance group and a decrease in the likelihood of being in the high academic group. For a male student-athlete with a prior likelihood of 50% of being in the high academic group, competing at a high intensity institution is related to a decrease in the likelihood of being in the high academic group to 31.8%.

For female student-athletes, attending a high intensity institution is significantly related to a decrease in the likelihood of being in the high academic performance group, but not significantly related to being in the low academic group.

Model fit

The fit measure assessed is the "-2 Log Likelihood" statistic, which has a chi-square distribution under the null hypothesis that all the predictor and control variables in a given model are zero. Across all models, for males and females, the degrees of freedom range from 6 to 12 and the obtained chi square statistics are all greater than 100, $\underline{P}s < .001$.

Discussion of key results

In reviewing the key results from our analyses, it is important to keep in mind the general finding that, in many cases, factors related to low and high academic performance are not the same. We believe this suggests that future research and policy deliberations should distinguish between conditions and situations that may help student-athletes not to fail from those that may help them excel.

Consistent with prior research, we found a student-athlete's race and type of sport to be significant predictors of academic performance (for all results presented, the term "prediction" should not be interpreted to mean proof of causal effects). For males especially, being Black (versus White) and competing in intercollegiate football or basketball (versus other sports) significantly increases the likelihood of being in the low academic performance group and decreases the likelihood of being in the high academic group.

SAT score (combined math and verbal) is not significantly related to the likelihood of being in the low academic performance group, although a high SAT score is related to an increased likelihood of being in the high academic group. In contrast, high school GPA is related (in the expected way) to both low and high academic performance at college. Because SAT scores currently play a powerful role in college admissions and athletic eligibility, the effectiveness of these scores for their intended purpose may need to be examined more closely.

Time spent in sports is not significantly related to the likelihood of being in the low academic group, although greater time spent in sports is related to a decreased likelihood of being in the high academic group. In contrast, the likelihood of being in the low academic group is increased by greater time spent socializing and less time spent preparing for class. With respect to academic risk, these results suggest that limiting the time student-athletes spend playing and practicing may be less important than helping them to make better time-management decisions regarding the use of free time for class preparation.

Student-athlete ratings of their coaches as knowledgeable, encouraging, and interested in players' academic pursuits are related to an increased likelihood of being in the high academic group and a decreased likelihood of being in the low academic group. Although this study could not distinguish the causal process underlying this relationship (e.g., coaches influencing academic success versus the possibility that academic success causes student-athletes to rate their coaches favorably), this finding highlights the importance of further exploring ways that coaches may help students succeed academically.

For male student-athletes, endorsing the statement, "the information I got during recruitment was misleading and caused serious problems" is related to an increased likelihood of being in the low academic group and a decreased likelihood of being in the

high academic group. This pattern is also similar for males who do not believe that the information they got during recruitment helped them to make the right college choice. Although this study cannot evaluate the possibility of a "sour grapes" retrospective by student-athletes experiencing the most academic difficulties, these findings at least suggest the need for careful review of the contents of recruiting activities on a regular basis. An additional finding in this area also suggests the need to review recruiting pressures on students -- being recruited through many (rather than few) activities, e.g., letters, phone calls, visits, is related to an increased likelihood of being in the low academic group and a decreased likelihood of being in the high academic group.

Living in school-owned or school-run housing with mostly other student-athletes is not significantly related to academic performance. In contrast, rooming with one or more teammates or other student-athletes is significantly related to an increased likelihood of being in the low academic performance group and a decreased likelihood of being in the high academic group. In light of current debates over athletic dormitories, these findings suggest that the academic success of student-athletes may depend more on their choice of roommate(s) than the type of housing they occupy.

Attributing greater importance to athletic grants for paying educational and living expenses is related to a decreased likelihood of being in the high academic group and, for females only, an increased likelihood of being in the low academic group. Although this finding is difficult to interpret, it suggests that athletic grants alone may not be sufficient to ensure academic success for student-athletes most at risk.

Attending an institution with "high intensity" football and basketball programs, e.g., strong win/loss records against comparable teams, is related to an decreased likelihood of being in the high academic group and, for males only, an increased likelihood of being in the low academic group. Similarly, for male student-athletes, participating in a more competitive NCAA Division I conference, e.g., I-A versus I-AA, is significantly related to an increased likelihood of being in the low academic performance group. Why should a higher level of intercollegiate competition be related to lower academic performance? The present study cannot answer this question other than to suggest that the possible extra pressures and demands on students associated with highly competitive programs be a subject for special study at either the national or (individual) campus level.

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Footnotes

1. These issues were debated at the January, 1991 convention of the National Collegiate Athletic Association (NCAA), which is the primary governing organization for college sports in the U.S.. At that convention the NCAA voted on and passed several landmark reforms including limitations on sport-related time demands and changes in levels of financial support for student-athletes. The full extent and impact of these reforms on the lives of student-athletes remains to be seen.

2. Father's and mother's occupations were first coded according to the U.S. Bureau of Census categories (1982) and then reclassified into SES job codes developed by Stevens and Cho (1985). If father's occupation was not available, mother's occupation was used in the SES composite.

3. The description of the INTENSITY variable comes from the NCAA Guide to the National Study Data Base, (1991).

4. The statistical model used to test the proportional odds assumption is documented in the *SAS Technical Report P-200*, SAS/STAT Software: CALIS and LOGISTIC Procedures for SAS release 6.04, SAS Institute Inc.

5. A more detailed description of this procedure, the development of case weights for the national study, and formulas used to modify case weights and calculate effective n can be found in chapter 6: "Methodological issues related to using the national study data base," in the *NCAA Guide to the National Study Data Base*, (1991).

6. Table 8 results for SATcomp represent units of one SAT point. To represent the result for a unit of 100 SAT points, multiply the reported parameter estimate by 100 and use the new estimate to recalculate the risk multiplier.